

REMARKS

Status Summary

Claims 21-25, 35, 38-40 and 45 currently stand rejected. In this Amendment, claims 22, 23, and 25 have been canceled or added. Therefore, upon entry of this amendment, claims 1-16, 21, 24, 26-28, and 35-45 will be pending.

Claim Rejection - 35 U.S.C. § 103

Claims 21-25, 35, 38-40 and 45 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,903,559 to Acharya et al. (hereinafter, "Acharya") in view of U.S. Patent No. 6,801,500 to Chandran (hereinafter, "Chandran"). This rejection is respectfully traversed.

Independent claim 21 recites a method for allocating bandwidth to a queue in a switch that includes receiving, from a user, a desired bandwidth in a standard bandwidth denomination provided by a switch. The desired bandwidth is automatically converted to at least one token bucket refresh rate by converting the desired bandwidth into a base bandwidth value and a residual bandwidth value, and computing a first token bucket refresh rate corresponding to the base bandwidth value and computing a second token bucket refresh rate corresponding to the residual bandwidth value. At least one token bucket that is associated with the switch is refreshed according to the base and residual bandwidth values. In the switch to be serviced, at least one queue is scheduled based on available tokens in the token bucket.

Independent claim 21 has been amended to recite that automatically converting the desired bandwidth includes converting the desired bandwidth into a base bandwidth value and a residual bandwidth value, wherein the base bandwidth value includes a bandwidth that is guaranteed to be provided every token bucket refresh interval by refreshing a first number of tokens every token bucket refresh interval and the residual bandwidth value includes a bandwidth that is spread over multiple token bucket refresh intervals by refreshing a second number of tokens every c token bucket refresh intervals, c being an integer greater than one, and wherein the base bandwidth value is greater than the residual bandwidth value. Support for this amendment can be found, for example, on page 7, lines 4-7, page 12, lines 15-19, and page 15, lines 1-24 of the present specification. Claims 24 and 38-40 depend from independent claim 21. Similar amendments have been made to claim 35. Claim 45 depends from independent claim 35.

Thus, independent claims 21 and 35 respectively recite a method and a system for converting the bandwidth into a base bandwidth value and a residual bandwidth value that is less than the base bandwidth value, where the base bandwidth value includes a bandwidth that is guaranteed every token bucket refresh interval by refreshing tokens every refresh interval and a residual bandwidth value includes a bandwidth that is spread over multiple token bucket refresh intervals that is achieved by refreshing tokens every c intervals, where c is an integer greater than 1.

For example, as described on pages 5-7 of the present specification, assuming that a refresh rate of 1 token per refresh interval corresponds to a bandwidth of 1 megabit per second, in order to achieve a user-specified (e.g., min, max, etc.) bandwidth of 1.1 megabits per second it would be necessary to provide 1.1 tokens per refresh interval. However, because a token is an atomic entity that cannot be divided into fractions, the desired bandwidth of 1.1 megabits per second is divided into a base bandwidth value of 1 megabit per second and a residual value of 0.1 megabits per second. (See pages 5-7 of the present specification).

Next, the base bandwidth value is converted into a base token value corresponding to the number of tokens to be placed in the token bucket every token bucket refresh interval and the residual bandwidth value is converted into a residual token value corresponding to the number of tokens to be placed in the token bucket less than every token bucket refresh interval. A “base token refresh rate” may then be derived using the base token value and the token refresh rate and, similarly, a “residual token refresh rate” may be derived using the residual token value, the token refresh rate, and a distribution algorithm. Continuing the example above wherein the base bandwidth value equals 1 megabit per second and the residual bandwidth value equals 0.1 megabits per second, and further assuming, inter alia, that 1 token corresponds to 1 byte and a token refresh interval of 1 second, the base token refresh rate equals 1 token per second and the residual token refresh rate equals, on average, 1 token every 10th second. (See Table 1 and page 16, line 6 – page 17, line 13 of the present specification). As described on pages 7 and 8 of the present

specification, an advantage of decomposing the desired bandwidth rate into a base bandwidth rate and a residual bandwidth rate is that incremental bandwidth can be automatically added to or subtracted from the bandwidth provided to a queue while avoiding burstiness and allowing the user to specify bandwidth in standard dominations, such as megabits per second, rather than token bucket refresh rates. (See page 7, line 11 – page 8, line 4 of the present specification).

Page 2 of the Official Action concedes that Acharya fails to disclose, teach, or suggest “scheduling a switch queue according to at least one token bucket [refresh rate] associated with a base bandwidth [value] and a residual bandwidth [value].” (See page 2 of the Official Action). However, the Official Action asserts that Chandran discloses this feature. Applicants respectfully disagree.

There is no disclosure, teaching, or suggestion in Chandran of converting a desired bandwidth value into a base bandwidth value and a residual bandwidth value, wherein the base bandwidth value includes a bandwidth that is guaranteed every token bucket refresh interval and a residual bandwidth value includes a bandwidth that is spread over multiple token bucket refresh intervals, as claimed in independent claims 21 and 35. In contrast, Chandran teaches that a minimum reserved rate and a maximum peak rate may be used for guaranteeing that the perceived rate as seen by the user is within a specified bandwidth range defined by the minimum and maximum rates (i.e., never falls below the reserved rate or exceeds the maximum peak rate). (See col. 1, lines 33-40 of Chandran). The residual bandwidth value recited in claims 21 and 35 is different from the maximum peak rate

disclosed in Chandran because the residual bandwidth value in claims 21 and 35 is less than the base bandwidth value while the maximum peak rate in Chandran is greater than the desired bandwidth rate. For example, applying the subject matter recited in claims 21 and 35, a desired bandwidth rate of 1.1 megabits per second corresponds to a residual bandwidth rate of 0.1 megabits per second. In contrast, according to Chandran, it is respectfully submitted that the maximum bandwidth rate for a desired bandwidth rate of 1.1 megabits per second corresponds to any suitable bandwidth value that is greater than 1.1 megabits per second (e.g., 1.15 megabits per second). Thus, the maximum peak rate in Chandran will always be different from the residual bandwidth value in claims 21 and 35 for a particular desired bandwidth rate (e.g., 0.1 vs. 1.15 megabits per second). For this reason alone, it is respectfully submitted that the rejection of claims 21-25, 35, 38-40 and 45 should be withdrawn.

Additionally, there is no disclosure, teaching, or suggestion in Chandran of a residual token value corresponding to the number of tokens to be placed in the token bucket less than every token bucket refresh interval (i.e., $c > 1$ in claims 21 and 35). Instead, Chandran discloses that the reserved and peak token bucket refresh rates are equal to the network interface token bucket refresh rate and includes placing a number of tokens in a token bucket every refresh interval. For example, regarding token bucket refresh rates, Chandran states:

The network interface could have a maximum capacity of N bits per second and each bit could be represented by one token. A spigot **109** would supply network interface token bucket **101** with N tokens per second. The N tokens may be added at one second intervals, or alternatively, spigot **109** may add a fraction of these N tokens at the same fraction of a second that has elapsed during an interval. (See col. 5, lines 54-56 of Chandran).

Whenever the interface token bucket **101** is refreshed, the reserved and peak rate token buckets are also refreshed. (See col. 5, lines 54-56 of Chandran).

According to the above-quoted passages in Chandran, N tokens are added to network interface token bucket **101** (e.g., 800 tokens) every refresh interval (e.g., every second), a number less than N tokens are added to reserved token bucket **103** (e.g., 200 tokens) every refresh interval, and a number less than N tokens are added to peak token bucket **105** (e.g., 300 tokens) every refresh interval. (See also, col. 5, lines 61-67 of Chandran). In contrast, according to claims 21 and 35, residual token value corresponding to the number of tokens to be placed in the token bucket less than every (i.e., $c > 1$) token bucket refresh interval (e.g., 1 token every 10th refresh interval).

Accordingly, because Acharya and Chandran, even when combined, fail to disclose, teach, or suggest converting a desired bandwidth value into a base bandwidth value and a residual bandwidth value, wherein the base bandwidth value includes a bandwidth that is guaranteed every token bucket refresh interval and a residual bandwidth value includes a bandwidth that is spread over multiple token bucket refresh intervals, it is respectfully submitted that the rejection of claims 21-25, 35, 38-40 and 45 under 35 U.S.C. § 103 should be withdrawn.

Allowable Subject Matter

Claims 1-16 are allowed. Claims 26-28, 36-37 and 41-44 were indicated as allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 26, 36, and 41 have been rewritten in independent form. Claims 27, 28, 37, and 42-44 each depend from one of claims 26, 36, and 41. Accordingly, claims 26-28, 36-37 and 41-44 should now be allowed.

CONCLUSION

In light of the above Amendments and Remarks, it is respectfully submitted that the present application is now in proper condition for allowance, and an early notice to such effect is earnestly solicited.

If any small matter should remain outstanding after the Patent Examiner has had an opportunity to review the above Remarks, the Patent Examiner is respectfully requested to telephone the undersigned patent attorney in order to resolve these matters and avoid the issuance of another Official Action.

Serial No.: 10/743,858

DEPOSIT ACCOUNT

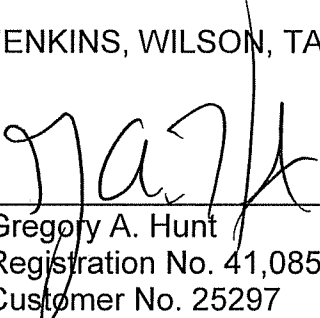
The Commissioner is hereby authorized to charge any deficiencies of payment or credit any overpayment associated with the filing of this correspondence to Deposit Account No. 50-0426.

Respectfully submitted,

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